

CLAIMS

What is claimed is:

1. An optical fiber switch comprising:

- a) a first stationary optical fiber array having:
 - 1) a front face,
 - 2) an optical fiber terminating at the front face, and
 - 3) a front face groove disposed in the front face and extending in a transverse direction
 - b) a second stationary optical fiber array having:
 - 1) a front face,
 - 2) an optical fiber terminating at the front face, and
 - 3) a front face groove disposed in the front face and extending in a transverse direction,
 - c) a movable fiber array disposed between the stationary optical fiber arrays, the movable fiber array having:
 - 1) a front face,
 - 2) a rear face opposite the front face,
 - 3) an optical waveguide extending between the front face and the rear face,
 - 4) a front face groove disposed in the front face and extending in a transverse direction,
 - 5) a rear face groove disposed in the rear face and extending in a transverse direction,
 - d) an object disposed in the front face grooves between the first stationary fiber array and the movable fiber array;
 - e) an object disposed in the front face groove and rear face grooves between the second stationary fiber array and the movable fiber array;
- whereby the movable array moves in a transverse direction by rolling or sliding on the objects.

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2. The optical fiber switch of claim 1 wherein the objects are spheres.
3. The optical fiber switch of claim 1 wherein the objects are spheroids.
4. The optical fiber switch of claim 1 wherein the objects are cylinders oriented with cylinder axes extending in the transverse direction..
5. The optical fiber switch of claim 1 wherein the objects are optical fiber segments.
6. The optical fiber switch of claim 1 wherein the fiber arrays comprise anisotropically etched silicon V-groove chips and the optical fibers are disposed in V-grooves, and the front face grooves comprise anisotropically etched V-grooves.
7. The optical fiber switch of claim 1 wherein the objects are in contact with surfaces of the front face grooves.
8. The optical fiber switch of claim 1 wherein the front faces define a gap spacing in the range of about 0.5 to 15 microns.
9. The optical fiber switch of claim 1 wherein the front faces are oriented at a angle of about 3-15 degrees from perpendicular to the optical fibers so that back reflection is reduced.
10. The optical fiber switch of claim 1 wherein the front face grooves and rear face groove comprise notches for

providing passive transverse positioning of the fiber arrays.

11. The optical fiber switch of claim 1 wherein the front face grooves and rear face groove comprise anisotropically etched surfaces.
12. The optical fiber switch of claim 1 wherein the front face grooves and rear face groove comprise isotropically etched surfaces.
13. The optical fiber switch of claim 1 wherein at least one fiber array includes an alignment sphere **72** and a micromachined pit **74**.
14. The optical fiber switch of claim 1 wherein the front face grooves and rear face groove have flat surfaces.
15. The optical fiber switch of claim 1 wherein the front face grooves and rear face groove have curved surfaces.
16. The optical fiber switch of claim 1 wherein the first stationary fiber array and the second stationary fiber array comprise a shared substrate.
17. The optical fiber switch of claim 1 wherein the first stationary fiber array and the second stationary fiber array comprise a shared common base chip **100** and a shared common top chip **106**.